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Kentucky's Efforts to Protect Its Groundwater: Uniqueness and Uniformity Among the States

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Groundwater is a vital source of our nation's drinking water and provides other valuable uses in industry, agriculture, and the commercial market. In Kentucky alone, 20% of the state's drinking water and 90% of the drinking water of rural Kentucky residents is supplied by groundwater.[1] Kentucky Natural Resources and Environmental Protection Cabinet's records reveal significant groundwater contamination.[2] In some areas this is due, in part, to landfills, leaking underground storage tanks, toxic spills and septic tanks.[3] The sources of potential groundwater contamination are numerous. Storm water runoff from city streets and other facilities can affect groundwater quality; leaks or spills of hazardous substances from above the ground sources can leach into the soil and groundwater; and improper, careless or outdated landfill practices can contaminate our drinking water.[4] Perhaps the biggest danger to Kentucky's groundwater supply are leaking underground storage tanks.[5]

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[1] Harold G. Vielhauer, *State Ready to Reveal New Groundwater Regs*, 5 Greater Cincinnati Business Record 23 (1993) [hereinafter Vielhauer]. *See also* Kentucky Environmental Quality Commission, State of Kentucky's Environment 59, 65 (1992).

[2] Vielhauer, *supra* note 1.

[3] Frederick R. Anderson, Daniel R. Mandelker & A. Dan Tarlock, Environmental Protection: Law and Policy 340 (2nd ed. 1990) ("Ground-water contamination refers to any degradation of ground-water quality resulting from human activities").

[4] Leslie Fuller Secrest, Thais Vitagliano & Steven Reiber, *Seep No Evil; Groundwater Contamination and Local Government*, 108 AM. CITY & COUNTY 34 (1993) [hereinafter Secrest].

[5] *Id.* ("[U]nderground storage tanks are another all-too-common source of groundwater contamination. Given the potential in certain soils for the rapid interchange between surface waters and groundwater, discharges and spills into streams and creeks also can affect groundwater and vice-versa."). *See also* Douglas A.Yanggen & Leslie L. Armhein, *Groundwater Quality Regulation: Existing Governmental Authority and Recommended Roles*, 14 COLUM. J. ENVTL. L. 1 (1989) [hereinafter Yanggen]. A list of the most familiar

The quality of groundwater is threatened in many parts of the country. While deliberate efforts have been made nationwide to improve the surface waters of the country, these efforts have occasionally affected the quality of our subsurface waters or groundwater. "[S]ome of the wastes that were previously disposed into surface waters or burned have now been diverted onto our land or to subsurface disposal, ultimately degrading groundwater quality in many instances."[6] This contamination threatens public health and the nation's continued use of groundwater.

Until the late-1970s, groundwater was considered a pristine resource and an endless source of drinking water. Since that time, the Federal government[7] and the Kentucky legislature[8] have begun to recognize the value and necessity of groundwater protection. Once contamination occurs, the groundwater in that area may remain contaminated for years, making the resource unusable over a significantly

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sources of contamination includes: leachate from landfills; septic systems; sewage and sludge disposal; liquid waste storage lagoons; underground storage tanks; highway salting and storage of salt; pesticide, and fertilizer storage and application; animal waste storage and spreading; and, mining. Secrest, *supra* note 4.

[6] Yanggen, *supra* note 5.

[7] *Id.* at n. 10 explains:

> The United States Congress has enacted numerous laws which address the need for groundwater protection in some fashion. For example, 33 U.S.C. §§1251-1387 (1982 & Supp. IV 1986), the Federal Water Pollution Control Act (FWPCA) (also known as the Clean Water Act); 42 U.S.C. §§ 6901-6991(i) (1982 & Supp. IV 1986), the Resource Conservation and Recovery Act (RCRA); 42 U.S.C. §§ 201, 300(f)-300(j)-11 (1981 & Supp. IV 1986), The Safe Drinking Water Act (SDWA); 42 U.S.C. §§ 9601-9675 (1982 & Supp. IV 1986), the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) or "Superfund"; 15 U.S.C. §§ 2601-2629 (1982 & Supp. IV 1986), the Toxic Substances Control Act (TSCA); and 7 U.S.C. §§ 136-136(y) (1982 & Supp. IV 1986), the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA).

[8]

> It is a finding of the General Assembly that groundwater is an important but vulnerable natural resource of this state, that the majority of rural Kentuckians rely exclusively on groundwater for drinking, and that groundwater is inextricably linked to surface waters which may also serve as a drinking water resource. It is also a finding that groundwater is a resource equally vital for agricultural, commercial, and industrial purposes and that useable groundwater is critical to the future development of these industries. Therefore, it shall be the policy of this state to manage groundwater for the health, welfare, and economic prosperity of all citizens.

KY. REV. STAT. ANN. § 151.110(2)(Michie/Bobbs-Merrill 1992). *See also* KY. REV. STAT. ANN.§§ 146.130; 151.232; 224; 224.10; 224.40; 224.43; 224.46; 224.99; 224.01-010; 224.10-100; 224.46-520; 224.70-100;224.70-110; 224.71-100; and 247.088 (Michie/Bobbs-Merrill 1995).

long period.[9] Clean-up of contaminated groundwater, if possible at all, is often expensive and difficult to accomplish.[10] Selection of the best clean-up strategy may be difficult due to the complexities of the hydrogeologic framework.[11] Accordingly, many environmentalists and governmental authorities agree that the regulations should emphasize prevention of groundwater contamination rather than monitoring and pollutant clean-up after contamination has already transpired.[12]

However, exactly who should have authority for promulgating these regulations and how groundwater contamination should be prevented are contested issues. There is disagreement over whether the Federal or state governments would be better to effectuate these prevention efforts. "Groundwater resources throughout the United States are diverse and require divergent protection strategies."[13]

Because of the need to control consumption withdrawals and coordinate ground and surface water management, groundwater protection may be primarily the state's responsibility.[14] A comprehensive uniform federal prevention program, administered by the EPA, would perhaps be too difficult to successfully implement.[15] Other Federal environmental protection programs already recognize the need for groundwater protection.[16] These Federal environmental regulations accomplish their respective goals with a watchful eye toward protection of the nation's groundwater resources.

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[9] Yangeen, *supra* note 5. *See also* OFFICE OF GROUNDWATER PROTECTION, U.S. ENVIRONMENTAL PROTECTION AGENCY, A GROUNDWATER PROTECTION STRATEGY FOR THE ENVIRONMENTAL PROTECTION AGENCY (1984). *Id.* at note 15.

[10] Yangeen, *supra* note 5. *See also* Tripp & Jaffe, *Preventing Groundwater Pollution: Towards a Coordinated Strategy to Protect Critical Recharge Zones*, 3 HARV. ENVTL. L. REV. 1 (1979).

[11] Anderson, *supra* note 3, at 346.

[12] *See supra* notes 8-9 and accompanying text. *See also* Vielhauer, *supra* note 1, at 23. The Groundwater Regulation Committee, composed of governmental agencies, including the environmental protection, agriculture and transportation agencies, along with special interest groups such as coal mining, oil and gas, environmental groups, local government and industrial representatives, are in agreement that the focus of regulation should shift from leak and spill detection and remediation for groundwater contamination from underground storage tanks and solid waste landfill programs to a policy of pollution prevention. "Pollution prevention measures include advance planning, toxic use reduction and the implementation of best management practices to prevent contamination." *Id.* at 23.

[13] Vielhauer, *supra* note 1, at 23.

[14] *See* UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, GUIDELINES FOR GROUND-WATER CLASSIFICATION UNDER THE EPA GROUND-WATER PROTECTION STRATEGY (1986)(where EPA reached this conclusion).

[15] Vielhauer, *supra* note 1, at 23.

[16] Yanggen, *supra* note 5, at 1.

There may be no single regulatory approach that state governments should utilize to effectuate their goal of groundwater protection. State regulations should reflect the individualized resources of their area and implement protection strategies that meet their needs. Kentucky's protection endeavors have focused both on prevention and remediation.

The primary focus of this note is to outline and critique state and Federal efforts to prevent groundwater contamination in Kentucky. More emphasis will be placed on the state government's role since states have the primary responsibility of prevention.

I. STATE GROUNDWATER REGULATION

A. Groundwater Protection Plans

Within Kentucky Revised Statutes section 151.110(2), the General Assembly recognizes "that groundwater is an important but vulnerable natural resource" of the Commonwealth. With the enactment of this statute, the legislature announced that it is the policy of this state "to manage groundwater for the health, welfare, and economic prosperity of citizens."[17] This policy, together with the state's more general policy "to conserve the waters of the Commonwealth for public water supplies,"[18] emphasizes that it is Kentucky's goal to protect its groundwater resources. The Cabinet[19] is authorized to develop administrative regulations for the protection of groundwater. In so doing, the Cabinet is expressly required to allow for the active involvement of the Agricultural Experiment Station, the Cooperative Extension Service of the University of Kentucky, the Division of Conservation within the Cabinet, and representatives of production agriculture in developing these regulations.[20]

The Cabinet also has the authority to develop and conduct a comprehensive program to ensure water quality protection and to balance utilization as consistent with the above environmental policy of the Commonwealth.[21] Under direct statutory authority, the Cabinet is also given the power to provide for the prevention, abatement, and

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[17] KY. REV. STAT. ANN. § 151.110(2)(Michie/Bobbs-Merrill 1992).

[18] KY. REV. STAT. ANN. §§ 12224.70-100(1)(Michie/Bobbs-Merrill 1978).

[19] *See* KY. REV. STAT. ANN. § 224.01-010(9)(Michie/Bobbs-Merrill 1995). "Cabinet" means the Kentucky Natural Resources and Environmental Protection Cabinet (KNREPC).

[20] KY. REV. STAT. ANN. § 151.232 (Michie/Bobbs-Merrill 1990).

[21] KY. REV. STAT. ANN. § 224.10-100(4)(Michie/Bobbs-Merrill 1994).

control of all water pollution.[22] With these goals in mind, the Cabinet adopted a regulation on June 8, 1994, promoting groundwater protection plans.[23]

This regulation, which became effective on August 24, 1994, does not focus upon remediation but requires the development of site specific prevention programs. Under it, certain activities necessitate the preparation and implementation of groundwater protection plans.[24] Common examples of these activities are landfills and underground storage tanks.[25]

This regulation allows for certain exceptions to the requirements if the party conducting the required activity can demonstrate, by substantial evidence, that "the activity has no reasonable potential of

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[22] KY. REV. STAT. ANN. § 224.10-100(5)(Michie/Bobbs-Merrill 1994).

[23] *See* 401 KY. ADMIN. REGS. 5:037 (1994). This administrative regulation established the requirement to prepare and implement groundwater protection plans to ensure protection of all current and future uses of groundwater and to prevent groundwater pollution.

[24] 401 KY. ADMIN. REGS. 5:037(2) (1994). Requiring any person responsible for conducting any of the following activities to prepare and implement a groundwater protection plan:

> (a) Storing or related handling of bulk quantities of pesticides or fertilizers for commercial purposes; (b) Storing or related handling of bulk quantities of pesticides or fertilizers for the purpose of distribution to a retail sales outlet; (c) Applying of pesticides or fertilizers for commercial purposes; (d) Applying of fertilizers or pesticides for public right-of-way maintenance or institutional lawn care; (e) Land treatment or disposal of a pollutant; (f) Storing, treating, disposing, or related handling of hazardous waste, solid waste, or special waste in landfills, incinerators, surface impoundments, tanks, drums or other containers, or in piles; (g) Commercial or industrial storing or related handling in bulk quantities of raw materials, intermediate substances or products, finished products, substances held for recycling, or other pollutants held in tanks, drums or other containers, or in piles; (h) Transmission in pipelines of raw materials, intermediate substances or products, finished products, or other pollutants; (i) Installation or operation of on-site sewage disposal systems; (j) Storing or related handling of road oils, dust suppressants, or deicing materials; (k) Application or related handling of road oils, dust suppressants or deicing materials; (l) Mining and associated activities; (m) Installation, construction, operation, or abandonment of wells, bore holes, or core holes; (n) Collection or disposal of pollutants in an industrial or commercial facility through the use of floor drains which are not connected to on-site sewage disposal systems, closed-loop collection or recovery systems, or a waste system permitted under the Kentucky Pollution Discharge Elimination System; (o) impoundments or containment of pollutants in surface impoundments, lagoons, pits, or ditches, or Commercial or industrial transfer, including loading and unloading, in bulk quantities of raw materials, intermediate substances or products, finished products, substances held for recycling, or other pollutants.

[25] *Id.*

altering the physical, thermal, chemical, biological, or radioactive properties of the groundwater in a manner, condition, or quantity that will be detrimental to the public health or welfare, to animal or aquatic life, to the use of groundwater as present or future sources of public water supply or the use of groundwater for recreational, commercial, industrial, agricultural, or other legitimate purposes."[26] In addition, this regulation exempts from its coverage normal use and consumption of products packaged for personal use and the retail marketing of these personal products.[27] The regulation also expressly exempts certain other activities from the preparation and implementation of a groundwater protection plan.[28]

Due to the increased public awareness of the sources of groundwater pollution, and the associated liability and clean-up costs, many localities already have implemented similar groundwater protec-

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[26] 401 KY. ADMIN. REGS. 5:037 § 2(3)(1994). Subsections (a)-(e) require that substantial evidence shall be demonstrated at a minimum based on the following factors:

> (a) Hydrogeologic sensitivity at or near the location of the activity; (b) Quantity of the pollutants, including the cumulative potential to pollute from small discharges, spills or releases which individually would not have the potential to pollute; (c) Physical, chemical, and biological characteristics of the pollutants, such as solubility, mobility, toxicity, concentration, and persistence; (d) Use of the pollutants at the locations of the activities; and (e) Present and potential uses of the groundwater.

[27] 401 KY. ADMIN. REGS 5:037 § 2(4)(a) (1994).

[28] 401 KY. ADMIN. REGS. 5:037 § 2(4) (1994). The provisions of this regulation shall not apply to the following activities:

> (c) Activities conducted entirely inside enclosed buildings if: (1) The building has a floor sufficient to prevent the release of pollutants to groundwater; and (2) There are no floor drains, or all the floor's drains within the building are connected to an on-site sewage disposal system, closed-loop collection or recovery system or a waste treatment system permitted under Kentucky Pollutant Discharge Elimination System; (d) Storing, related handling, or transmission in pipelines of pollutants that are gases at standard temperature and pressure; (e) Storing municipal solid waste in a container located on property where the municipal solid waste is generated and which is used solely for the purpose of collection and temporary storage of that municipal solid waste prior to off-site disposal; (f) Installing and operating sewer lines or water line approved by the cabinet; (g) Storing water in ponds, lakes or reservoirs; (h) Impounding storm water, silt, or sediment in surface impoundments; (i) Application of chloride-based deicing materials used on roads or parking lots; (j) Emergency response activities conducted in accordance with local, state, and federal law; (k) Fire fighting activities; (l) Conveyance or related handling by motor vehicle, rolling stock, vessel, or aircraft; (m) Agricultural activities at agriculture operations; or (n) Application by commercial applicators of fertilizers or pesticides on lands used for agricultural operations.

tion efforts.[29] However, different procedures have been used to effectuate the protection. Accordingly, different levels of participation will be needed to satisfy the requirements of this regulation. "Some entities will not need to change their practices, procedures or facilities. Others will need varying levels of change to prevent groundwater pollution."[30] Therefore, the exact number of individuals or companies required to develop groundwater protection plans, as well as the cost incurred by these entities,[31] cannot be determined.

The groundwater protection plan establishes the practices to be adhered to by the party conducting a regulated activity. In drafting the plan, each party takes into consideration certain generic and site-specific factors which make their groundwater protection plan unique to their particular environmental setting. Every plan must contain general information including the facility's name and address, identification of activities necessitating the creation of a plan, identification of all practices chosen within the plan to protect groundwater, an implementation schedule for these plans including employee training regarding the proper practices to follow, an inspection schedule, and a certification by the plan's administrator that the plan adheres to the requirements outlined within the regulation.[32]

The regulation's goals are that each party will evaluate the available technological means to protect groundwater from pollution and will then design an effective plan to combat pollution. The regulation provides certain strategies that may be considered within a party's groundwater protection plan. They include, although not exclusively, equipment design, operational procedures, preventive maintenance techniques, construction techniques, personnel training, spill response capabilities, alternative material or processes, implementation of new technology, modification of equipment or facility, best management practices, hazardous waste contingency plans, and runoff or infiltration control systems.[33]

Additionally, the regulation adopts certain specific practices that

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[29] NREPC, DEPARTMENT FOR ENVIRONMENTAL PROTECTION, DIVISION OF WATER, REGULATORY IMPACT ANALYSIS, published in 401 KY. ADMIN. REGS. 5:037 (1994).

[30] *Id.*

[31] *See supra* note 23 and accompanying text. The costs incurred will vary depending on the current and past practices and present policies of each entity. Many individuals and companies have implemented practices and procedures designed to prevent groundwater pollution under existing regulatory programs. Others have, in response to information concerning groundwater remediation costs and liability associated with groundwater pollution, implemented voluntary procedures and practices to prevent groundwater pollution.

[32] 401 KY. ADMIN. REGS. 5:037 § 3 (4) (1994).

[33] *Id.* at § 3.

must be followed by parties and incorporated within their respective protection plans. These practices include the following:(1)loading and unloading areas must have spill prevention, control, and operation procedures designed to prevent pollution; (2) parties cannot install a new or replace an existing on-site sewage disposal system if there is an available publicly owned treatment works (POTW) capable of treating the discharged pollutants; (3) if existing floor drains are identified which do not discharge to an on-site sewage disposal system, a closed-loop collection or recovery systems or a waste treatment system permitted under KPDES, discharge must be terminated or connected to one of the above systems; (4) the installation of new floor drains must utilize one of the above systems; (5) any party utilizing a tank or sump must prepare and implement good housekeeping practices, operating procedures, operator training, and spill response procedures and consider the use of leak control devices, secondary containment, integrity testing, mechanical inspections, and overfill protection devices; and, (6) the construction of new surface impoundments, lagoons, pits or ditches should be designed and operate to minimize the discharge of pollutants into the soil (in so designing, the constructor must consider the use of liners, secondary containment, leak detection devices, and other appropriate and effective control systems).[34] Variances from these requirements may be granted by the written approval of the Cabinet.[35]

Generic groundwater protection plans may be used by the party if the activities identified in the plan are substantially identical to an established pattern and if the factors identified as necessitating the creation of a plan do not cause substantial differences in the potential to pollute among locations.[36] The Cabinet also offers prepared groundwater protection plans for the use of existing residential septic systems or the construction, operation, closure, and capping of water wells.[37] If the generic plan was prepared by another person or group, including a trade organization, the party responsible for preparing the plan must receive the approval of the Cabinet before its implementation. Otherwise, copies of any site-specific or generic groundwater protection plan must be retained by the party responsible for

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[34] *Id.* at § 3(5).

[35] *Id.* at § 3(6).

[36] 401 KY. ADMIN. REGS. 5:037 § 1(11) (1994) defines "generic groundwater protection plan" as "a groundwater protection plan that can be applied to activities conducted at different locations because the activities are substantially identical and because the potentials of the activities to pollute groundwater are substantially the same."

[37] *Id.* at § 3(8)(d).

implementing the plan at the location of the activity.[38]

At any time, by written request, the Cabinet may require the submission of a copy of the plan or a written demonstration of why a plan was not required for this activity pursuant to this regulation.[39] If such a request is made, a response must be submitted to the Cabinet within thirty (30) days of the request.[40] After the plan's submission, the Cabinet maintains the authority to require certain revisions to be made in the plan and that a corrected plan be received within thirty (30) days of the Cabinet's notice of deficiency in the original plan.[41]

The public also has a right to inspect these plans. The plan's administrator should respond to a person's written request within ten (10) working days. The plan's administrator must notify the would-be inspector where the plan may be reviewed or send a written response explaining the reason a plan preparation was not required for this activity.[42]

This regulation seeks to prevent groundwater pollution by mandating the creation and implementation of protection plans. Prevention of groundwater contamination will make monitoring and remediation efforts less common. Still, some practices present the danger of contamination and require constant monitoring.

B. Groundwater Monitoring and Protection at Waste Disposal Sites

1. Hazardous Waste

Under Kentucky statutory law, no person is permitted to engage in the storage, treatment, recycling, or disposal of hazardous waste without first obtaining a permit for such operations from the Cabinet.[43] As a prerequisite, a permit applicant must demonstrate that the proposed facility can be "integrated into the surroundings in an environmentally compatible manner, including, but not limited to, insuring that hydrologic, seismologic, geologic, and soil considerations have been adequately addressed in the permit application and in an

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[38] *Id.* at § 4(1)(a)(b).

[39] *Id.* at § 4(4)(a)(b). Within its Regulatory Impact Analysis, the Cabinet indicates that it will review approximately 40 plans each year.

[40] *Id.*

[41] *Id.* at § 4(6).

[42] 401 KY. ADMIN. REGS. 5:037 § 4(7) (1994).

[43] KY. REV. STAT. ANN. § 224.46-520(1) (Michie/Bobbs-Merrill 1990).

operational plan."[44] Statutory authority also requires the maintenance of groundwater monitoring practices at existing hazardous waste incinerators, landfills, or other facilities which provide for the land disposal of hazardous waste,[45] as well as establishing closure and post-closure monitoring/maintenance standards for the termination of operations at sites created for the disposal of hazardous waste.[46] Because of the slow progression of groundwater contamination, these post-closure monitoring and maintenance standards of a permitted facility must be conducted for a minimum of thirty (30) years after closure of the facility.[47] At that time, the monitoring and maintenance standards will only be terminated if the Cabinet approves the termination request following an opportunity for public notification and a hearing on the termination of the site requirements.[48]

2. Solid Waste

Kentucky statutory law also requires a person establishing, constructing, operating, or maintaining a solid waste disposal site to first obtain a permit from the Cabinet.[49] The Cabinet may require the owner and operators of contained, construction/demolition, residual landfills, and other solid waste sites or facilities to conduct groundwater monitoring to accomplish corrective measures in the event of

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[44] *Id. See also* 401 KY. ADMIN. REGS. 34:060 (1994) which establishes the minimum standards for new hazardous waste sites or facilities. These requirements include the creation of a monitoring and response program and the maintenance of groundwater protection standard levels.

[45] 401 KY. ADMIN. REGS. 35:060 (1994).

[46] 401 KY. ADMIN. REGS. 35:070 (1994).

[47] KY. REV. STAT. ANN. § 224.46-520(4) (Michie/Bobbs-Merrill 1990).

[48] *Id.*

> Upon receipt of such application, the cabinet shall provide a notice to the public and to the owner and operator and an opportunity for a hearing on the termination of the site. In this proceeding, the burden shall be on the applicant to prove by clear and convincing evidence that additional post-closure monitoring and maintenance of the site is no longer required, in which case the applicant shall be relieved of such responsibility; or that additional post-closure monitoring and maintenance of the site as specified in a plan of operation is still required, in which case the cabinet may order appropriate remedial measures, impose restrictive covenants as to future use of the property involved, or otherwise condition termination as may be necessary for adequate protection of public health and the environment.

See also the Administrative Procedure Act whereby in accordance with its requirements for formal rulemaking the cabinet must provide an opportunity for public notice and hearing.

[49] KY. REV. STAT. ANN. § 224.40-305 (Michie/Bobbs-Merrill 1991).

documented groundwater contamination.[50] The statutory aim of this provision is to detect groundwater contamination at the earliest possible stage in order to allow remediation procedures before it is too late to successfully cleanup the polluted water. Efforts to effectuate this goal include groundwater quality characterization, groundwater monitoring plans, design requirements for groundwater monitoring systems, and sampling/analysis requirements.[51] "The groundwater quality monitoring system to be utilized in the groundwater monitoring plan shall accurately analyze groundwater quality and characterize local groundwater flow and flow systems."[52] According to these design specifications:

> the system must consist, at a minimum, of at least one (1) reference or background well, at a point hydraulically upgradient from the disposal area . . . and, [a]t least three (3) monitoring wells at points hydraulically connected in the direction of decreasing static head from the area in which solid waste has been or shall be disposed.[53]

This regulation also provides for the development and submission to the Cabinet of a groundwater assessment plan if laboratory analysis detects the presence of one or more parameters above the maximum contaminant level at one or more of the monitoring wells at the site or facility.[54]

The objectives of the groundwater monitoring are to maximize the likelihood of intercepting groundwater contaminated with leachate from landfills and provide early detection in hope of providing an adequate time frame for corrective action.[55] Since hydrogeologic composition varies from site to site, it is extremely difficult to specify the exact number, location, and depth of wells needed to monitor groundwater contamination levels.[56] Accordingly, preventive measures should remain the focus of our state's groundwater protection efforts.

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[50] 401 KY. ADMIN. REGS. 48:300 (1994).

[51] *Id.*

[52] *Id.* at §5.

[53] *Id.*

[54] *Id.* at §8.

[55] Christopher G. Ward & Lisa McDaniel, *Subtitle D: Groundwater Monitoring and Corrective Action Requirements; Landfill Regulations*, 124 PUBLIC WORKS 54 (1993).

[56] *Id.*

C. Cost-Sharing Funds to Implement Practices to Prevent Groundwater Contamination

In April, 1994, the Kentucky General Assembly established the "Kentucky Soil Erosion and Water Quality Cost-Share Fund" to be administered by the Soil and Water Conservation Commission.[57] Proceeds from this fund are to be used to provide financial assistance for the implementation of best management practices for, *inter alia*, the prevention of surface water and groundwater pollution.[58] The Commission has the authority to adopt regulations that mandate practices eligible for the funds, establish priorities for applications, and determine eligible amounts and caps on the distribution of funds.[59] Under this statute, Local Conservation Districts determine the eligibility of persons to receive these funds. Practices eligible for these funds must include agricultural and silvicultural activities. The statute mandates that priority for the funding must be given to animal waste management systems, where animal waste has been identified as a water pollution problem, and to members of an agricultural district. To be considered for funding for the prevention of groundwater pollution, persons practicing in agricultural or silvicultural production must submit a groundwater protection plan to the Local Conservation Districts and agree to maintain best management practices[60] for a determined period of time. As of November, 1994, the Soil and Water Conservation Commission had not adopted any regulations to effectuate this goal.

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[57] KY. REV. STAT. ANN. § 146.115, § 146.121 (Michie/Bobbs-Merrill 1994).

[58] 401 KY. ADMIN. REGS. 5:037 § 1(3) (1994) defines "best management practices" as:

> [S]chedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the Commonwealth. Best management practices also include treatment requirements, operating procedures, and practices to control plant site run-off, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

[59] As of October 1, 1994 the Commission had not promulgated any regulations to this effect.

[60] 401 KY. ADMIN. REGS. 5:037 § 1(3) (1994).

II. FEDERAL GROUNDWATER REGULATIONS

Most legislative and regulatory efforts appear to focus on the surface water pollution problem. Accordingly, when Congress began to address the issue of groundwater pollution it left in place whatever current state regulatory programs existed.[61] However, five separate federal statutes confront the groundwater pollution problem in a piecemeal fashion.

A. The Safe Drinking Water Act (SDWA)

Concern over the safety of public drinking water was the impetus behind the creation of the Safe Drinking Water Act of 1974.[62] The Act requires the EPA to create maximum permissible contaminant levels[63] in public water systems providing drinking water. "The primary maximum contaminant levels for drinking water from public water systems include levels for microorganisms, turbidity, and organic/inorganic chemicals."[64]

The secondary standards are those that according to judgment of the Administrator are necessary to protect the public welfare.[65] Such standards apply to any contaminant which may adversely affect the color, odor, and appearance of water.[66] Within the SWDA's 1986 amendments, Congress mandated that the EPA must publish maximum contaminant levels and promulgate National Primary Drinking Water Regulations for contaminants identified in the Federal Register as those necessary to protect public health.[67] Additionally, every three (3) years, the Administrator must publish maximum contaminant level goals and promulgate national drinking water regulations which in his/her judgment may have adverse effects on health and are known or anticipated to occur in public water systems.[68] Within each

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[61] Anderson, *supra* note 3.

[62] 42 U.S.C. §§ 300f-300j-26 (1994).

[63] "Maximum contaminant level means the maximum permissible level of a contaminant in water which is delivered to any user of a public water system." *Id.* at § 300(f)(3). The term applies to public water systems. *Id.* at § 300(f)(1)(A).

[64] Anderson, *supra* note 3, at 684-85. *See also* 40 C.F.R. § 141 (1989) (Maximum contaminant levels for inorganic chemicals is located at § 141.11; Maximum contaminant levels for organic chemicals is located at § 141.12; and Maximum contaminant levels for turbidity is located at §141.13).

[65] 42 U.S.C. § 300(f)(2).

[66] 40 C.F.R. § 143 (1995). *See also* Anderson, *supra* note 3, at 685.

[67] *See* 42 U.S.C. § 300(g)-1(b)(2)(A). *See also* 40 C.F.R. §143 (1995).

[68] Anderson, *supra* note 3, at 685. *See also* 40 C.F.R. § 143 (1995); 42 U.S.C. § 300(g)-1(b)(3)(A).

primary drinking water regulation the Administrator recommends the technology, treatment techniques, and other means deemed feasible for purposes of satisfying the applicable maximum contaminant level.[69]

An owner of a public water system must notify the public served by the system about any violation of a maximum contaminant level or any other violation designated by the Administrator as posing a serious health concern.[70] Additionally, a public water systems' failure to comply with any national primary drinking water regulation subjects it to direct civil action by the EPA.[71] The EPA has the authority under these regulations to assume enforcement of the standards if the state fails to remedy the situation.[72]

In addition, the Safe Drinking Water Act requires each state to establish an EPA approved Underground Injection Control (UIC) program to prevent the endangerment of the nation's drinking water sources.[73] The UIC program involves the setting of injection well specifications and regulation of: (1) radioactive and hazardous waste disposal wells; (2) industrial and municipal wells within one quarter of a mile of an underground drinking water source; (3) oil and natural gas recovery wells; and, (4) mineral and geothermal energy extraction wells.[74] The UIC program also establishes requirements for issuing injection well permits.[75] Federal legislation requires the state plan to include within their permitting requirements that an applicant demonstrate the injection well will not endanger drinking water supplies prior to approval of injection activity.[76]

Kentucky has adopted a statutory provision providing for the

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[69] *See* 42 U.S.C. § 300(g)-1(b)(6). For example, these regulations may establish recordkeeping protocol, monitoring and analysis requirements, and notification, as well as filtration and disinfection criteria. Anderson, *supra* note 3, at 685.

[70] 42 U.S.C. § 300(g)-3(c)(1).

[71] 42 U.S.C. § 300(g)-3(a)(2).

[72] 40 C.F.R. § 142.10(b)(6) (1995). *See also* Anderson, *supra* note 3, at 685.

[73] 42 U.S.C. § 300(h). *See also* Anderson, *supra* note 3, at 685.

[74] 40 C.F.R. § 144 (1995). Kentucky's UIC program is located at 40 C.F.R. §§ 147.900-147.905 (1995). *See also* Anderson, *supra* note 3, at 685.

[75] "Any person may petition the Administrator for the issuance of a permit for the operation of such a well in such an area. A petition submitted under this paragraph shall be submitted in such manner and contain such information as the Administrator may require by regulation." 42 U.S.C. § 300(h)-3(b)(2). When the Administrator receives the petition, it must be published in the Federal Register. An opportunity for agency hearing must be provided. *See also* Anderson, *supra* note 3, at 686.

[76] 42 U.S.C. § 300(h)(b). "The Administrator may issue a permit for the operation of a new underground injection well in an area . . . only if he finds that the operation of such well will not cause contamination of the aquifer of such area so as to create a significant hazard to public health." 42 U.S.C. § 300(h)-3(b)(3).

creation of the Drinking Water Protection Fund. Moneys distributed from this fund are to be used for the administration of the Safe Drinking Water Act in this state. Emphasis remains on the provision for technical assistance to public water systems within the state, support for the development of special studies performed by the director for the monitoring and testing of drinking water quality, and, promotion of programs for the prevention of contamination of surface/ground water supplies that are sources of drinking water in Kentucky. Under this statute, the director is entitled to make loans to owners and operators of public water systems for the emergency remediation threatening the contamination of public water supplies.[77]

An aquifer which is "the sole or principal drinking water source" for an area, and which, if contaminated, would create a significant public health hazard is expressly protected under the Safe Drinking Water Act.[78] The Act provides financial incentives to the states for protection of these aquifers. Federal financial assistance may not be committed to a project that threatens contamination of a sole or principal source aquifer.[79] States may receive amounts of up to 50%, directly from the EPA, for development and installation costs of an approved comprehensive contamination management plan to preserve a critical aquifer protection area.[80] Additionally, the SDWA provides federal grants for state programs seeking to protect wellhead areas from pollution.[81]

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[77] KY. REV. STAT. ANN. § 151.110 (Michie/Bobbs-Merrill 1992).

[78] 42 U.S.C. § 300(h)-3(e) (1994). Whether an area has an aquifer which is the sole or principal drinking water source for that area is determined by the Administrator on his own initiative or by petition. *Id.*

[79] *Id. See also* Anderson, *supra* note 3, at 686.

[80] 42 U.S.C. § 300(h)-6(j) (1994). *See also* Anderson, *supra* note 3, at 686.

[81] 42 U.S.C. § 300(h)-7 (1994). EPA is authorized to make grants to the states for not less than 50 nor more than 90 percent of the costs associated with development and implementation of the state plan. 42 U.S.C. § 300(h)-7(k).

B. The Resource Conservation and Recovery Act (RCRA)

In response to the hazardous waste problem, Congress in 1976 enacted this comprehensive and complex regulation.[82] RCRA provides for the formal identification of hazardous wastes,[83] a written record system tracking all waste shipments,[84] and a permitting certification system.[85] The permitting system ensures performance standards for safe treatment, storage, and disposal of hazardous wastes are being achieved.[86] With these performance standards for the treatment, storage, and disposal of hazardous wastes, this Federal legislation seeks to protect groundwater before remedial measures become necessary. To obtain a permit, an applicant must comply with regulations concerning incineration, chemical treatment, liquid restrictions in landfills, site location, groundwater and leachate monitoring, labeling, recordkeeping, fencing and warning signs, special employee training and emergency procedures, and final site closure.[87] Congress has prescribed design and operation standards which focus on the prevention of hazardous releases at a facility while under operations and some thirty (30) years after the facility's closure.[88] In light of the Love Canal incident, landfill leachate is at the root of concern over hazardous waste disposal. To prevent such a reoccurrence, the Act provides for the implementation of liner systems to prevent migration of waste into adjacent soils, groundwater, or surface water.[89]

The Act also establishes performance standards for groundwater protection through monitoring and correction actions.[90] Surface impoundments, landfills, and land treatment facilities are required to have a monitoring program to assess the facility's impact on groundwater.[91] However, the Administrator may exempt a facility upon a

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[82] The Resource Conservation and Recovery Act of 1976, § 101, 42 U.S.C. §§ 6901-6991(i) (1994).

[83] 42 U.S.C. § 6921 (1995).

[84] 42 U.S.C. § 6928 (1995).

[85] 42 U.S.C. § 6925 (1995).

[86] Anderson, *supra* note 3, at 604.

[87] *Id.* at 605. Each person owning or operating an existing facility or planning to construct a new facility for the treatment, storage, or disposal of hazardous wastes, as identified by this Act, is required to have a permit to conduct such activity. 42 U.S.C. § 6925(a) (1994).

[88] Anderson, *supra* note 3, at 606.

[89] *Id.* at 607.

[90] 42 U.S.C. § 6924. "The standards under this section concerning groundwater monitoring are applicable to surface impoundments, waste piles, land treatment units, and landfills." *Id.*

[91] *Id.*

showing of reasonable certainty that there will be no migration of hazardous wastes.[92] These protection efforts assume that hazardous waste within the groundwater will be detected and removed through corrective action.[93]

In summary, groundwater protection within RCRA involves a three tier response. First, groundwater monitoring and detection for leachates within a facility's uppermost groundwater must occur during the operating period, closure, and a post-closure period of thirty (30) years.[94] Second, if contamination of groundwater is detected, the Act necessitates the commencement of more extensive monitoring and EPA will specify ambient tolerances permitted within the groundwater.[95] Last, if the ambient tolerances established by the EPA are exceeded, RCRA requires that corrective action begin.[96] The 1984 Amendments to RCRA require that corrective measures be undertaken retroactively anytime there is a release of hazardous waste despite when the waste was placed at the facility.[97] These Amendments also require that corrective action be taken beyond the facility's boundaries where necessary to protect human health and the environment.[98]

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[92] *Id.*

[93] ANDERSON, *supra* note 3, at 606.

[94] 42 U.S.C. § 6924. *See also* Anderson, *supra* note 3, at 606.

[95] Anderson, *supra* note 3, at 606.

[96] *Id.* at 607. The text suggests that construction of slurry wells and counter pumping would be examples of such corrective measures the EPA would suggest upon the detection of excess ambient tolerances.

[97] 42 U.S.C. § 6924(u). A permit must "require corrective action for all releases of hazardous waste or constituents from any solid waste management unit at a treatment, storage, or disposal facility seeking a permit under this subchapter, regardless of the time at which waste was placed at such unit". *Id.*

[98] 42 U.S.C. § 6924(v). A facility may be exempted from this provision if the owner or operator of the facility demonstrates to the satisfaction of the Administrator that, despite the owner or operator's best efforts, he/she was unable to obtain the necessary permission to take corrective action. *Id.*

C. Comprehensive Environmental Response Compensation and Liability Act (CERCLA)

While RCRA's regulatory scheme is prospective in nature, CERCLA[99] is a retrospective effort to clean-up our nation's hazardous waste disposal sites. Through this regulatory clean-up effort, the quality of our groundwater can be drastically improved.[100] The impetus behind the creation of CERCLA is the placing of responsibility for cleaning up hazardous waste sites on the responsible parties,[101] providing monetary assistance for federal cleanups,[102] and site study[103] to effectuate these goals. However, this task has proven to be an ominous one. The EPA estimates that there are about 27,000 contaminated hazardous waste sites across the country. Critics argue that substantially more such sites do in fact exist.

CERCLA provides for both present and future response at these contaminated sites to reduce the risk of immediate health threats as well as to minimize the future effects upon human health. To minimize the contamination's effects, "[t]he statute creates a federal trust fund, Superfund, to pay for government responses and provides a mechanism for the government to sue potentially responsible parties (PRPs) for these costs in order to replenish the fund."[104] Under CERCLA, the EPA is authorized to recoup both removal and remedial costs from a PRP.[105] Remedial costs contemplate the long-term costs associated with the cleanup of groundwater around the hazardous waste site.[106]

Although, CERCLA has proved effective in responding to emer-

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[99] The Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), 42 U.S.C. §§ 9601-9675 (1994). "The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) was originally passed in 1980. The Act was subsequently amended by the Superfund Amendments and Reauthorization Act in 1986 (SARA)." *See also* Anderson, *supra* note 3, at 613-19.

[100] The President is required, under CERCLA, to give the highest priority to clean-up of facilities where the release of hazardous substances, pollutants, or contaminants "has resulted in the closing of drinking water wells or has contaminated a principal drinking water supply". 42 U.S.C. §9618.

[101] 42 U.S.C. § 9607(a).

[102] 42 U.S.C. § 9611(a). Congress created the Hazardous Substance Superfund to provide funds for payment of governmental response costs. *Id.*

[103] 42 U.S.C. § 9660(b)(4). Congress has appropriated funds for research, testing, evaluation, development, and demonstration projects of sites at which a release and response costs have been expended. *Id.*

[104] Anderson, *supra* note 3, at 615.

[105] 42 U.S.C. § 9604.

[106] 42 U.S.C. § 9604(a)(2).

gency accidents such as spills, efforts to minimize long-term risks have not been as effective. The costs and administrative procedures to ensure continued follow-up have proven too burdensome a task to successfully minimize long-term risks associated with hazardous waste sites. The President is not authorized to provide any remedial action assistance to a state unless the affected state first enters into a contract or cooperative agreement with the government binding it to all future maintenance of the removal and remedial actions, assures the availability of an acceptable hazardous waste disposal facility, and agrees to pay at least 10 percent of remedial costs.[107]

Remedial cleanup efforts include the creation of a lengthy site and remedy evaluation process. A remedial investigation and feasibility study is conducted for each release to determine the extent of the threat posed by the contaminants as well as to develop a proposed remedy to effectively combat the pollution.[108] Section 121 of SARA,[109] requires the EPA to select cost-effective cleanup resources and subordinates the costs associated with these remedial measures to concerns for public health and environmental protection.[110] The priority for public health and environmental protection is evident from two major constraints imposed on the EPA's selection of appropriate remedial measures: (1) "actions in which treatment . . . permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants . . . are to be preferred over remedial actions not involving such treatment."[111] Secondly, off-site transport and disposal of hazardous substances or contaminated materials without such treatment, where practicable treatment technologies are available, should be the least favored alternative remedial action.[112]

The requisite general cleanup standard required under SARA for remedial actions is linked to standards adopted under other federal and state environmental laws. At the very least, all remedial actions must achieve a degree of cleanup that "assures protection of human health and the environment, that is cost-effective, and utilizes permanent solutions."[113] "If another federal standard or a more stringent

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[107] 42 U.S.C. § 9604(c)(3). *See also* Anderson, *supra* note 3, at 615.

[108] Remedial investigations and feasibility studies (RI/FS) are to be commenced for all facilities listed on the National Priority List . 42 U.S.C. § 9616(d).

[109] 42 U.S.C. § 9621.

[110] 42 U.S.C. § 9621(b)(1).

[111] *Id.*

[112] *Id.*

[113] Anderson, *supra* note 3, at 663. *See also* 42 U.S.C. § 9621(b)(1)(A)-(G).

standard under a state environmental or facility siting law is 'legally applicable,' the level of control attained by the remedial action must 'at least' attain the standard."[114] Presently, EPA has adopted the practice of the three-part agency classification of groundwater: (1) Environmental Protection Agency, Ground-Water Protection Strategy;(2) Final Draft Guidelines for Ground-Water Classification under the EPA Ground-Water Protection Strategy, and to rely on MCL's; and, (3) state standards contained in the Safe Drinking Water Act.[115] The result of this practice is that the standards are applied to the groundwater at the CERCLA site but not at the facility's boundary. Thus, contaminated groundwater which is potential drinking water for public consumption must be protected so it may be safely used for this purpose.

"RCRA's groundwater protection standards will be the most likely 'legally applicable' standards."[116] Under RCRA, a site owner may avoid the standards normally applied to disposal facilities if the owner can prove, on a case-by-case basis, that some alternative level of control at a particular point in the groundwater will serve to completely protect human health and the environment.[117] If the owner satisfies this burden, then he/she must demonstrate an "Alternative Concentration Level" (ACL) will effectively and fully protect public health and the environment at that site.[118] "RCRA's ACLs may not be used to establish alternative concentration limits in Superfund cleanups if, subject to limited exceptions, the remedial process assumes human exposure beyond the boundaries of a site."[119]

> EPA may select a remedial action, however, that does not attain a level or standard of control at least equivalent to legally applicable or relevant criteria if it finds that (1) the remedial action is part of a larger remedial plan that will attain the required standard, (2) compliance will result in increased health and environmental risks compared with alternative options, (3) compliance is technically impracticable, (4) through the use of another method or approach

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[114] Anderson, *supra* note 3, at 663. *See also* 42 U.S.C. § 9621(d)(2)(A)(ii). However, the statute does not provide the definition of legally applicable standards. "The legislative history indicates that a statutory standard is legally applicable if the statute 'subjects to regulation' a hazardous substance, even though the statute does not 'apply directly to the situation involved at the hazardous waste site'". *Id. See also* H.R. REP. No. 253, 99th Cong., 1st Sess. pt. 5, at 53 (1985).

[115] Anderson, *supra* note 3, at 664.

[116] *Id.*

[117] 42 U.S.C. § 6924(d).

[118] 40 C.F.R. § 264.94(b) (1995).

[119] Anderson, *supra* note 3, at 664. *See also* 42 U.S.C. § 9621(d)(2)(B).

> the action will attain an equivalent standard of performance, (5) the state has not consistently applied the standard it seeks to require, or (6) section 104 Fund balancing suggests that the monies necessary to meet the standard would be more effectively spent to protect public health and the environment at other sites.[120]

The potential vastness of liability under CERCLA is unprecedented. The EPA may recover the costs of cleanup from four classes of PRPs:[121] (1) owners or operators of vessels or facilities that contain hazardous substances; (2) owners or operators of a facility at the time of disposal; (3) persons who arranged for disposal; and,(4) any person who accepted hazardous substances for transport or disposal.[122] Liability under the Act is strict and joint and several.[123] Fairness concerns raised by the Act's far-reaching liability are outweighed by Congressional intent to accomplish fast cleanups by those responsible for contamination before the devastating effects of the contamination become unsurmountable by corrective measures. Furthermore, the longer the contamination is allowed to continue the higher the costs of remediation efforts become.

D. Clean Water Act (CWA)

Although, groundwater protection is not explicitly addressed within the Clean Water Act,[124] an expansive reading of the definition of navigable waters as well as an in depth analysis of two sections contained within the Act implicitly suggest that the CWA, effectively enforced, can protect our nation's groundwater. The CWA explicitly prohibits the EPA Administrator from approving a state's National Pollutant Discharge Elimination System (NPDES) permit program[125] unless the state's program adequately grants the state authority to control the disposal of pollutants into wells.[126] NPDES permits establish the effluent limitations a discharger of pollutants must satisfy

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[120] Anderson, *supra* note 3, at 664. *See also* 42 U.S.C. § 9621(d)(4)(A-F).

[121] 42 U.S.C. § 9607.

[122] *Id.*

[123] Applicable defenses for a PRP under the Act include "an act of God; an act of war; or an act or omission of a third party other than an employee or agent of the defendant, or than one whose act or omission occurs in connection with a contractual relationship, existing directly or indirectly, with the defendant". 42 U.S.C. § 9607(b). These defenses must be proven under a preponderance of the evidence standard. *See also* Anderson, *supra* note 3, at 616.

[124] Federal Water Pollution Control Act (CWA).

[125] 33 U.S.C. § 1342(a)(1).

[126] Anderson, *supra* note 3, at 364. *See also* 33 U.S.C. § 1342(b)(1)(D).

and the deadline for achieving the limit.[127] In addition, the statute provides that EPA program permits for the discharge of any pollutant must be subject to the same conditions, requirements, and terms as state program permits.[128]

However, a leading environmental law case, suggesting that Congress did not know enough about groundwater pollution at that time to attempt a comprehensive federal regulatory effort, has held that the EPA lacks the requisite authority to control the disposal of wastes into wells unless these wells are connected to surface waters.[129] The Court concluded that Congressional intent was, indeed, to leave groundwater regulation up to the states. Although contrary authority suggests that the CWA has sufficient authority to regulate groundwater pollution, the leading decision on the subject remains that of the 5th Circuit's. Accordingly, the primary federal regulatory authority for the control of groundwater pollution remains the Safe Drinking Water Act and the Resource Conservation and Recovery Act.

III. SUGGESTED MODIFICATIONS IN KENTUCKY'S GROUNDWATER PROTECTION EFFORTS

Indeed, states must bear the majority of responsibility associated with protecting our nation's groundwater. Suggestions for modifying Kentucky's present approach to groundwater protection include the adoption of the following 10-point program:

> [1] comprehensive mapping of aquifer systems; [2] anticipatory classification of aquifers; [3] ambient groundwater standards; [4] establishment of authorities for regulation; [5] programs for monitoring, data collection and data analysis; [6] effective enforcement provisions; [7] surface use restrictions to protect groundwater quality; [8] programs to control groundwater withdrawals; [9] coordination of groundwater and surface water management; and, [10] coordination of groundwater programs with other relevant natural resource protection programs.[130]

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[127] 33 U.S.C. § 1342(b)(1)(B). The Administrator is permitted to approve a state permit for a fixed term not to exceed five years. *Id.*

[128] 33 U.S.C. § 1342(a)(3). *See also* Anderson, *supra* note 3, at 364.

[129] Exxon Corp. v. Train, 554 F.2d 1310 (5th Cir. 1977). *See also* Anderson, *supra* note 3, at 686.

[130] John M. Winton, Laurie A. Rich, Mimi Bluestone & Linda J. Wilson, *Water Treatment; The States Zero in on Groundwater Regulation*, CHEMICAL WEEK, Feb. 11, 1987, at 29.

Kentucky's regulatory efforts have already incorporated many of these measures into its groundwater protection efforts. The Kentucky Natural Resources and Environmental Protection Cabinet is the leader of the protection scheme. With its involvement, the state has adopted programs for monitoring, data collection, and data analysis as well as prospective measures for protection such as groundwater protection plans. The Cabinet has proposed regulations establishing groundwater classification systems, groundwater quality standards, and groundwater permits.[131] This proposal met with great opposition from both business and environmental groups and was successfully defeated in favor of more preventive measures, including groundwater protection plans.[132] A more effective means for protection may include the incorporation of a similar classification standards, and permit programs. It is important to remember that "pollution prevention measures include advance planning, toxic use reduction, and the implementation and aggressive enforcement of best management practices to successfully prevent groundwater contamination."[133]

CONCLUSION

The protection of groundwater quality is primarily the responsibility of state and local governments. Because of the need to control consumption withdrawals and the necessity of coordinating groundwater and surface water protection efforts the states assume this responsibility. The federal government could not successfully accomplish protection efforts through a comprehensive regulatory scheme. The divergent hydrogeologic framework of the ground makes remediation efforts to correct contamination costly and virtually impossible to successfully achieve.[134] Accordingly, preventive measures should remain the direct focus of protection efforts.

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[131] Vielhauer, *supra* note 1.

[132] *Id.*

[133] *Id.*

[134] UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, GUIDELINES FOR GROUNDWATER CLASSIFICATION UNDER THE EPA GROUND-WATER PROTECTION STRATEGY (1986).